no cirrus at a higher level; and while the low cloud *c* moves from north-east, the white cloud *w* may be coming either from north-east or more probably from north-west.

The puzzling nature of cloud perspective makes it very difficult to interpret the appearance of these clouds. There can be little doubt that the lower clouds, *c*, are the product of the condensation of rising columns of air; but while the somewhat cumuloform structure of *w* ought also to indicate an upward motion, the flat top, and outward diffusion, would suggest a more horizontal motion. I cannot therefore suggest any rational explanation of the building of these shower clouds; and the true nature of this phenomenon will only be discovered when the theodolite is used to determine whether *w* lies vertically or horizontally in the blue sky.

RALPH ABERCROMBY.

Lake Titicaca, February 28.

A FLAT FISH NURSERY.

PROF. EWART submitted the following report at a recent meeting of the Scotch Fishery Board:—

"I have to report that I recently discovered in the inshore waters what might best be described as a flat fish nursery. This nursery, which is about five miles in length, and from two to four miles in width, stretches along an exposed and only slightly indented shore, where the sea rises during spring tides from sixteen to twenty feet. The bottom of this area consists chiefly of fine sand, covered here and there with large patches of the common sea-mat (*Flustra*); the average depth is about four fathoms. When a small beam-trawl (with a net having meshes small enough to capture all the fish over two inches in length) was carried over the bottom parallel to and at a distance of about half a mile from the shore, large numbers of small flat fish were invariably secured. On one occasion as many as five hundred and sixty of these small fish were taken in less than an hour, and at all times the 'take' was large, and usually from 80 to 85 per cent. of the small flat fish were under two and a half inches in length. Some distance from the shore the takes were smaller, and on one occasion the trawl only secured twenty-three small fish, when used in about ten fathoms of water, some seven miles from shore. Along with the small flat fish, there were usually a few small round fish, a number of shrimps—sometimes over, sometimes considerably under one pint—numerous hermit and other crabs, and large quantities of *Flustra*. As it may be possible to materially increase the fish supply by affording protection to the young fish, I hope to be able ere long to report that other similar nurseries have been found, and also as to whether flat fish during their earlier stages of growth frequent the inshore in preference to the offshore waters.

"I have also to report that Mr. Scott (who in January last secured many thousands of plaice eggs floating in the open sea over a shoal of spawning plaice) has recently come across a large shoal of spawning haddocks which were apparently resting on the bottom at a depth of about 30 fathoms some fifteen miles off the coast of Banff. The surface waters over the shoal were crowded with haddock and cod eggs at nearly all stages of development. At a single sweep Mr. Scott with his tow-net secured nearly half a million eggs, while the trawlers were capturing hundreds of the spawning fish that were resting on or moving about near the bottom."

NOTES.

THE annual *conversazione* of the Royal Society will be held on Wednesday, May 8.

AT a meeting of the American Academy of Arts and Sciences on April 10, in Boston, the Rumford Medals were presented to Prof. Albert A. Michelson.

WE regret to have to record the death of Mr. R. Stirling Newall, F.R.S., at the age of seventy-seven. Mr. Newall's name was well known in connection with the invention and manufacture of wire rope and telegraphic cables. Just before his death he offered as a gift to the University of Cambridge the 25-inch refracting telescope which he had constructed some years ago.

THE Civil Service Estimates for the year ending March 31, 1890, show that a sum of £41,221 will be required for the maintenance of the Natural History Museum, South Kensington, for the present financial year. The corresponding sum in the Votes last year was £40,934. The principal increase is under the head of "Purchases and Acquisitions," for which the sum asked is £4700 instead of £3700. On the other hand, there is a decrease of £915 under the head of "Furniture and Fittings." The remaining heads do not show any material variation.

DR. LENDENFELD'S "Monograph of the Horny Sponges," which the Royal Society are about to publish, is now nearly through the press. It will consist of about 950 pages of text and over 50 plates.

WE have received the Report of the Mason Science College, Birmingham, for the year ended February 23, 1889. It is hardly creditable to Birmingham that the authorities of such an institution as this should still have to complain of a deficiency of income. Although the amount of the deficiency compares very favourably with those in former years, the Council feel that the economies they have been forced to adopt in order to decrease the difference between income and expenditure seriously impair the College work by hampering the Professors, especially those who have laboratories under their charge and require costly apparatus to illustrate their teaching.

PROF. H. G. SEELEY, to whom a sum was assigned from the Government Grant for a research on the Permian or Trias Reptilia, has been spending his Easter recess in St. Petersburg and Moscow. The officers and professors of the Academy, the University, and the School of Mines at St. Petersburg have shown him every attention, and his work in the museums appears likely to lead to important results.

MUCH excellent work has been done by the London Geological Field Class, which is carried on under the direction of Prof. H. G. Seeley. The Report relating to the excursions during the summer of 1888 shows that the work is conceived in a thoroughly scientific spirit, and that it cannot fail to exercise a most wholesome intellectual influence on all who take part it. This year, on account of Prof. Seeley's projected visit to South Africa in July, the class will begin its labours earlier than usual. The first excursion will take place on May 4. Many persons interested in geology ought to take advantage of this opportunity for the study of the country around London, and we are glad to learn that the secretaries have received the names of more subscribers than they have received at the same date in any previous year.

MR. DUTHIE, the Government Botanist for Northern India, who has been at work with Dr. King, of the Howrah Botanical Gardens, in classifying the plants collected by him when attached to the Black Mountain Expedition, has now been directed by the Government to make a special study of the grasses and fodders of Upper India.

THE *Times of India* says that the Sukkur Bridge, which has been constructed over the Indus, has now been opened. At Sukkur the river is very rapid, but the large island of Bukkur, standing about midway in the stream, was of great assistance in carrying out the plans. There are thus two bridges, one from Bukkur to the left bank, the other from Bukkur to the right bank. The latter consists of three spans, the longest of which is 278 feet; the former, known as the Sukkur Bridge, is in length between the abutments no less than 790 feet. Two cantilevers, 310 feet long, one from each side, were erected, and the intervening space of 200 feet was crossed by a girder. There was thus a space between the pillars of 820 feet, which is said to be the largest span of any rigid bridge in the world. The weight of the span is 3300 tons. The bridge was sent out in pieces from the works of Messrs. Westwood, of Poplar, and now, sixteen months after the arrival of the materials from England, it is practically complete.

A CORRESPONDENT writes to us about a "find" which, he thinks, may prove to be of some interest. At Hornsey, near Turnpike Lane, an excavation—about 18 or 20 feet wide, and about 20 feet deep—is being made in connection with a new pumping-station. In cutting into the clay, the men have come upon large fragments of a white substance, in the inside of which are what appear to be "the vertebræ of some animal." Our correspondent expresses a hope that some one competent to form an opinion about the matter will "take a run down to Turnpike Lane" (near the Great Northern station at Hornsey), and examine the objects which he believes to be fossils. After the present week, he says, there will probably be no opportunity of seeing the clay in the state in which it was when the objects were removed from it.

AT the meeting of the Scientific Committee of the Royal Horticultural Society, on April 23, Mr. W. T. Thiselton Dyer presented a note from Mr. Scott, the Director of the Meteorological Office, relating to the "useful" temperature as reckoned in "day degrees," and to the amount of sunshine since January 1 of the present year, as compared with recent years. The present season, it seems, has been much better than the last, except as regards the amount of sunshine, in which there is not much improvement.

SIR JAMES HECTOR has issued the Meteorological Report for New Zealand, containing observations for the years 1883 and 1884. Returns have been published since 1853, but since the year 1880 the number of stations has been greatly reduced, in favour of current weather reports; the principal stations are now only four in number. With the view of enabling daily weather reports to be issued by the press throughout the colony, with the least possible expense, a series of twenty typical isobaric charts were prepared and are shown in the Report. Each represents a certain type of weather and bears a distinguishing number, which is telegraphed to the leading journals, so that when the number for the day is quoted, the diagram can be printed, and, although not absolutely correct, it is of great assistance in making known the general condition of the weather. The Report also contains some valuable returns from stations in the Fiji group of islands.

A NEW amine, methyl-ethylamine, $C_2H_5(CH_3)NH$, has been obtained by Drs. Skraup and Wiegmann, by the action of alcoholic potash upon morphine. Not only is the actual preparation of this hitherto unknown amine of importance in itself as completing a series of isomers of the formula C_3H_9N, but the fact of its derivation from morphine also throws considerable light upon the constitution of that alkaloid. It has been shown by several chemists that morphine, $C_{17}H_{19}NO_3$, is a derivative of phenanthrene, $C_{14}H_{10}$. As a methyl and an ethyl group have now been extracted in the form of an amine, it appears very likely that these groups are present in morphine, replacing two hydrogen atoms of phenanthrene and probably attached to nitrogen. If this be so, morphine may turn out to be the isonitrile of a substituted phenanthrene, and it remains now for future work to test the truth of this, and to determine the positions and functions of the oxygen atoms. In the latter connection, it was found in the course of this investigation that, in addition to the volatile amine, a second substance of phenol-like properties was also formed, but great difficulties were met with in its purification. In the actual experiments, morphine was heated for about five hours at 180° C. with ten times as much of a twenty per cent. solution of potash in alcohol. A volatile substance of amine-like odour was evolved, and was driven over by means of a current of coal gas into dilute sulphuric acid. The filtered acid solution was then supersaturated with soda and the purified amine distilled over in steam into a standard solution of hydrochloric acid. It was only found possible to eliminate from the morphine in this way about 50 per cent. of its nitrogen. The concentrated hydrochloric acid solution deposited crystals of a hydrochloride, and the solution also gave with platinum chloride crystals of a platino-chloride melting at 208°. Analysis of this latter salt showed that the amine present possessed the empirical formula C_3H_9N. There are four possible isomers of this formula, three of which, trimethylamine, propylamine, and isopropylamine, have been prepared; and methyl ethylamine, which has hitherto been unknown. The hydrochloride yielded the base itself, by action of the strongest potash, in the form of a clear liquid of intense amine odour, unlike, however, that of trimethylamine. The properties of its salts were also found to exclude the possibility of its being propyl- or isopropylamine, so an attempt was made to prepare synthetically the only other possible isomer, methyl-ethylamine. This was successfully accomplished by heating methyl iodide with a mixture of 30 per cent. ethylamine solution and alcohol in a sealed tube at 100° for three hours. The product was distilled as far as possible in steam, the residue decomposed with potash, and the remainder of the volatile amines driven over in steam. The aqueous solution of the mixed distillate was then shaken with ethyl oxalate, and successive products were obtained, on concentration, of diethyl oxamide, acid ethylamine oxalate, and, lastly, the oxalate of the sought-for base, methyl-ethylamine. This salt, when recrystallized, melted at 154°, like the oxalate prepared from the amine derived from morphine; and from it the hydrochloride, platinochloride, gold chloride, and free base were prepared, in every case the products being identical with those prepared from the base of morphine.

MESSRS. SMITH, ELDER, AND CO. have issued a third edition of Darwin's work on "Coral Reefs." To this edition Prof. Bonney contributes an appendix, giving an account of recent speculations—about which there was lately so much discussion in NATURE—as to the origin of coral reefs.

A CHEAP edition of Darwin's "Journal of Researches into the Natural History and Geology of the Countries visited during the Voyage of H.M.S. *Beagle* round the World," has been published by Mr. Murray. The portrait of Darwin which appeared in the NATURE series of "Scientific Worthies" is prefixed to this edition.

MESSRS. CHARLES GRIFFIN AND CO. have published a sixth edition of "A Pocket-book of Electrical Rules and Tables for the use of Electricians and Engineers," by John Munro and Andrew Jamieson. The work has been thoroughly revised, and enlarged by about 120 pages and 60 new figures.

SOME valuable contributions towards a Flora of Caithness, by J. F. Grant and Arthur Bennett, have been reprinted from the *Scottish Naturalist*. The number of species and varieties that are admitted for the county of Caithness is over 600, a fair number, the authors think, considering the physical features of the county. Caithness has about 80 species that have not yet been found in Sutherland, and about the same number not yet found in the Orkneys.

THE Smithsonian Institution has issued six lithographs illustrative of the anatomy of *Astrangia Danae*. The plates were drawn by Mr. Sonrel, in 1849, under the direction of Prof. Agassiz, who intended to prepare a complete memoir on the subject. Mr. J. Walter Fewkes has written an explanation of the plates to make them available to students of marine invertebrates.

A new number of the *Internationales Archiv für Ethnographie* has been issued. It consists of Parts I. and II. of the second volume; and the contents, as in every preceding number of this excellent periodical, are full of interest for students of ethnography. There are three long articles—all in German. In the first, Dr. F. von Fuschan gives an instalment, carefully illustrated, of a paper on an amusement popular in Turkey, corresponding to the magic lantern. The second is an elaborate essay, also illustrated, by Dr. H. Schurtz, on knives made in various parts of Africa for the purpose of being thrown. In the third article, Mr. R. Parkinson, of New Britain, brings together many valuable ethnological facts relating to the inhabitants of the Gilbert Islands.

The "Uses of Plants," by Prof. G. S. Boulger, which is about to be published by Messrs. Roper and Drowley, is a manual of economic botany, having special reference to vegetable products introduced during the last fifty years. It enumerates all vegetable substances in use in England as food, materia medica, oils, gums, rubbers, dyeing, tanning, and paper-making materials, fibres, timber, &c., both home-grown and imported; and there are short essays on the recent progress of vegetable technology in its various branches.

In a Report lately received, Mr. W. Fawcett, Director of Public Gardens and Plantations, Jamaica, gives an interesting account of a visit of a few days to the Cayman Islands during May 1888. In an appendix he gives a list of the plants he collected, for the determination of which he expresses indebtedness to the authorities at Kew. "From this list," says Mr. Fawcett, "it will be seen that about 20 per cent. of the species are found more or less throughout the tropics. They are such as one might expect to find on any tropical island. It is interesting to note that one of the ferns (*Acrostichum aureum*) which is found growing to a height of 6 to 10 feet in swamps in Jamaica and throughout the tropics, was one of the first plants to establish itself on the Island of Krakatao, where the terrible volcanic disturbance completely destroyed every vestige of plant life. On its shore was also found the fruit of another plant occurring in the Cayman Islands, viz. the almond tree (*Terminalia Catappa*)."

At a recent meeting of the Royal Asiatic Society of Japan, a paper was read by Dr. Seymour on the hygiene of Japanese houses, in which he disproves the common idea that dwelling-houses in that country are very unhealthy. A Japanese house, is, on the whole, suited to Japanese life. The extreme airiness of the structure prevents the charcoal fires doing the inhabitants any injury. Its chief defects can be easily remedied. The boarding of the floor can be made more close-fitting; ventilating panels should be used; the ceilings could with advantage be higher, and the drainage should be well looked after. Amongst foreigners there is distinctly more illness in brick and stone houses than in the wood or frame houses, on account of the damp remaining in the walls of the brick houses while it dries up almost immediately in the others. The remarkably small infant mortality amongst the Japanese shows that their houses are healthy and suited to their modes of life.

Mr. F. A. Heron has been appointed an Assistant in the Zoological Department of the British Museum, not in the Geological Department, as stated (by a printer's error) in Nature, vol. xxxix. p. 590.

The additions to the Zoological Society's Gardens during the past week include two Macaque Monkeys (*Macacus cynomolgus* ♂ ♀), from India, presented by Mr. J. G. Mackie; two Caracals (*Felis caracal*) from Bechuanaland, presented by Captain Treville Cookson; a Ring-tailed Coati (*Nasua rufa*) from South America, presented by Mr. William Shiell; a Long-eared Owl (*Asio otus*), European, presented by Mr. Thomas B. Butler; three Orbicular Horned Lizards (*Phrynosoma orbiculare*) from Mexico, presented by Mr. T. H. Collins; a Rhesus Monkey (*Macacus rhesus* ♀), four Concave-casqued Hornbills (*Dichoceros bicornis* ♂ ♂ ♀ ♀) from India, a Crowned Hornbill (*Anthracoceros coronatus*) from Malabar, a Nepalese Hornbill (*Aceros nepalensis*) from Nepal, deposited; a Peacock Pheasant (*Polyplectron chinquis* ♂) from British Burmah, a Squacco Heron (*Ardea ralloides*) from Southern Europe, purchased; a Yellow-footed Rock Kangaroo (*Petrogale xanthopus* ♀), a Derbian Wallaby (*Halmaturus derbianus* ♀), born in the Menagerie.

OUR ASTRONOMICAL COLUMN.

The April Meteors.—Few of the April meteors appear to have been visible this year. They were watched for by Prof. Herschel at Croydon, Mr. Denning at Bristol, Mr. Backhouse at Hurworth (near Darlington), Mr. Monck at Dublin, and other observers. The shower of Lyrids was but weakly represented, and meteors generally were scarce. Several conspicuous ones were, however, recorded from the secondary streams of the April epoch. On April 20, at 10h. 16m., a meteor equal to Sirius was seen between Corvus and Virgo by Mr. Backhouse, and at the same time Prof. Herschel recorded a second-magnitude in Perseus. A comparison of the two paths shows the objects to have been identical, and the heights of the meteor at its beginning and end points, as computed by Prof. Herschel, were 50 and 46 miles respectively (over Derbyshire), which is much lower than usual. The radiant-point was at 301° + 34°. Another brightish meteor was seen on April 21, at 10h. 16m., by Prof. Herschel and Mr. Denning, and its heights were from 76 miles above a point near Newport, Monmouthshire, to 60 miles near Brecon. The radiant was at 217° - 2°, near μ Virginis. A fine meteor, quite equal to Venus, was observed at Bristol on April 27, at 8h. 51m., slowly descending in Hercules. Its path was from about 218° + 49½° to 249° + 32¼°. It left a trail of sparks as it fell, and its lustre fluctuated in a remarkable manner.

The White Spot on Saturn's Ring.—Prof. Holden reports that a careful examination of the ring of the planet with the great Lick equatorial on several evenings from March 2 to March 24 has resulted in the detection of no abnormal appearance in it. A kind of yellowish deformation or lump was indeed noticed close to the shadow on two or three occasions, but it proved to be due partly to bad definition, for it was only seen when the air was unsteady, and partly to contrast, for a similar appearance was produced in any part of the ring by the use of an occulting bar.

The Variable X Cygni.—Mr. Yendall gives a new determination of the elements of this variable in *Gould's Astronomical Journal*, No. 191. Discovered by Mr. Chandler in 1886, it has proved a variable of very interesting character, and its light changes still require much study. The rise from minimum to maximum is generally sharp, but the interval varies much in length, the range being from 3·3 days to 8·7 days; the mean interval being 6·9 days. The curve is flat at minimum, and from these two circumstances Mr. Yendall has confined himself to the use of the maxima alone in the determination of his new elements. The decrease from maximum to minimum shows a remarkable halt, sometimes a positive rise, almost important enough to be considered a secondary maximum. Lastly, the magnitude touched at the extreme points of the curve varies from epoch to epoch, but with a general correspondence between the two phases, a bright maximum being accompanied by a bright minimum, and the contrary. A connection between the duration of the rise and the brightness at maximum has not yet been established. The elements given by Mr. Yendall are—

1886 October 10d. 6h. 11·8m. Camb. M.T. ± 52·3m. +
16d. 9h. 36m. 51s. ± 2·3s. E.

Photographic Determination of the Brightness of the Stars.—No. 7 of vol. xviii. of the *Annals of the Harvard College Observatory* details the progress of the researches in stellar photography carried on at that institution by the assistance of the Bache fund, the particular direction in which the inquiry is being carried on being the determination of stellar magnitudes by means of photography. The present work is concerned with the determination of the brightness of the stars in three particular regions, each with special qualifications for the functions of standard stars; viz. 1000 close circumpolar stars, 420 stars in the Pleiades, and over 1100 equatorial stars. These three catalogues have been prepared with great care; the errors of the different photographic plates fully examined, and the relation of photometric to photographic magnitude investigated. The work